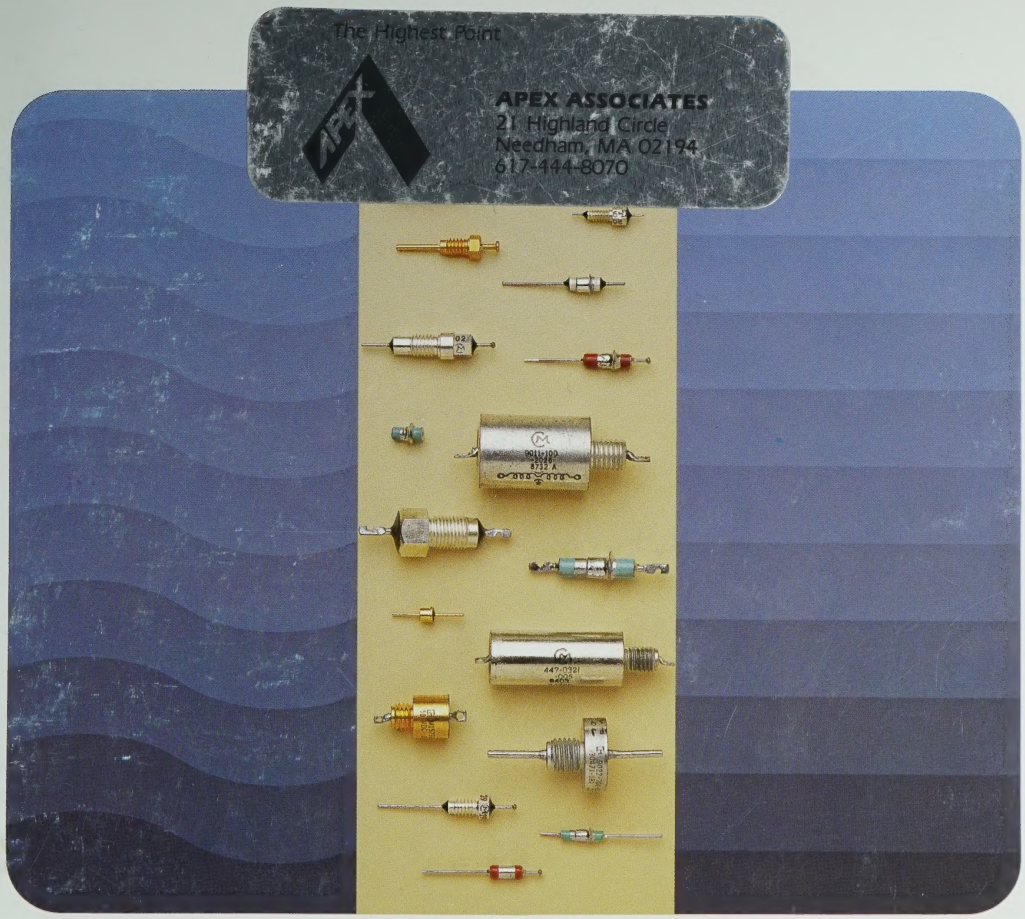
LOW PASS EMI FILTERS

CATALOG NO. 65-03



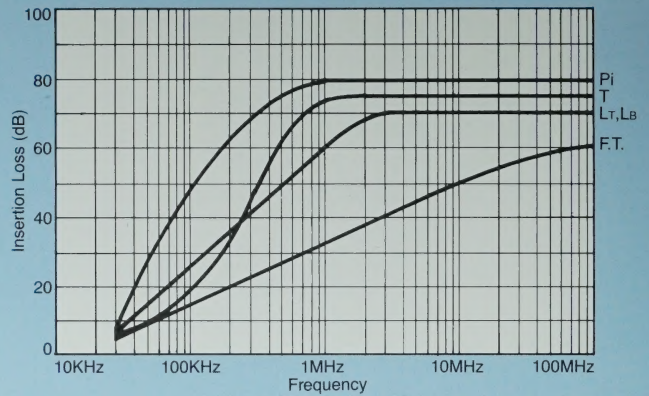
muRata ERIE®

MURATA ERIE NORTH AMERICA

Murata Erie is an EMI filter manufacturer dedicated to the design and production of high quality EMI filters and filtering systems for the electronics industry. In-house facilities include a complete design and manufacturing capability for EMI filters, a Quality Assurance System meeting or exceeding the requirements of MIL-Q-9858 and AQAP 1 and a fully equipped and qualified calibration laboratory. To compliment this design and manufacturing expertise, Murata Erie has a complete Customer Service and Customer Engineering staff that offers comprehensive customer application assistance.

The products described in this catalog represent a cross-section of Murata Erie's filter capabilities. Many more styles and variations are also available to meet virtually every industrial and MIL application requirement. For additional information or application assistance, contact your local Murata Erie Sales Office or our Customer Engineering Departments in Trenton, Ontario, Canada at 613-392-2581.

COMPARISON OF FILTER STYLE AND INSERTION LOSS PERFORMANCE



I.L. Versus Frequency
(For Various Filter Configurations)

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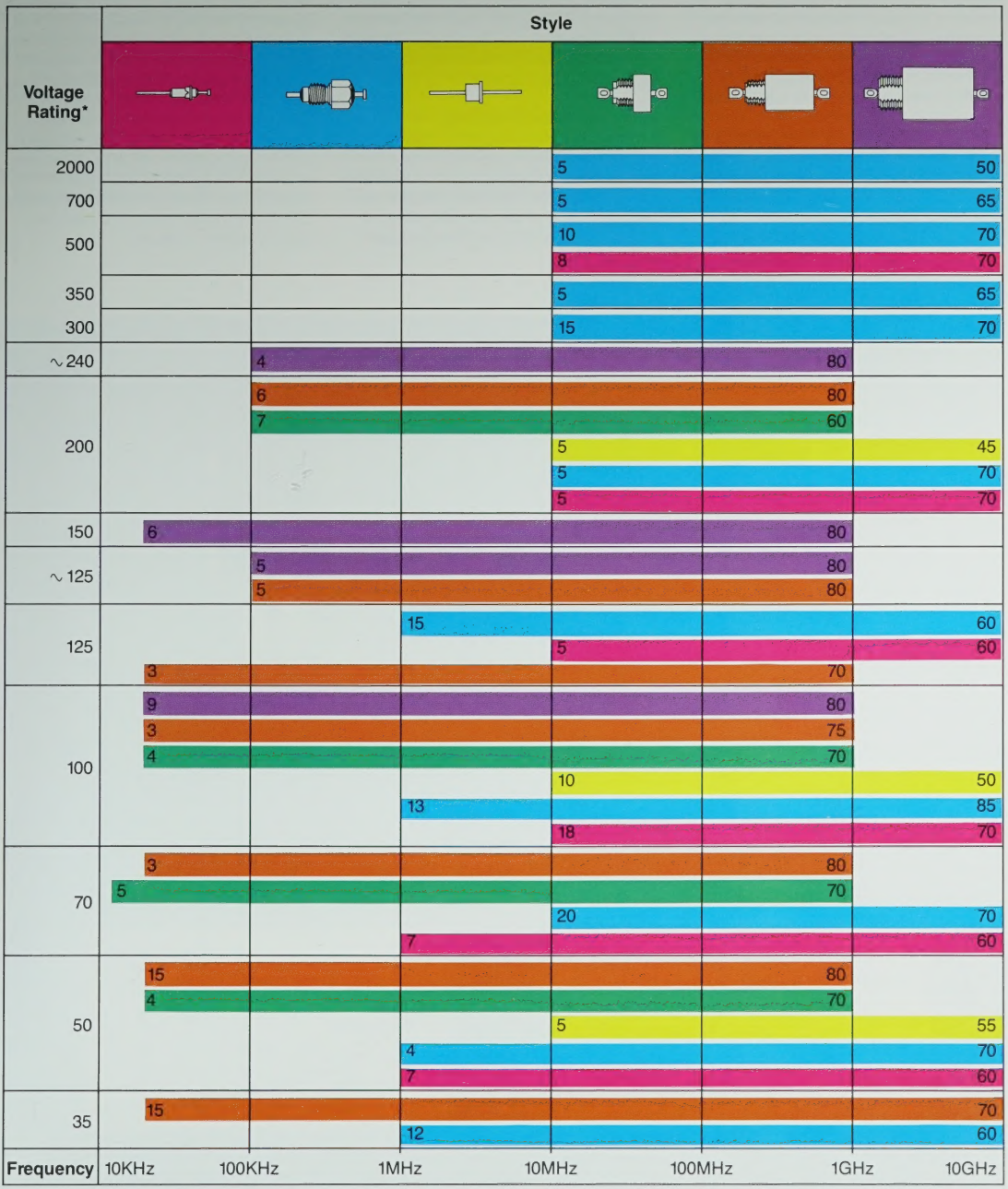
LOW PASS EMI FILTER SELECTION GUIDE

murata ERIE

This Filter Selection Guide offers a quick and easy method for finding a suitable EMI filter for your application. Simply match your required voltage rating to the attenuation range desired. Then use the color coded labeling to find the appropriate section in the catalog.



*Voltage in DC unless otherwise noted (~=AC symbol)

•——•: denotes the frequency stopband range. The attenuation figures listed are in dB.

LOW PASS EMI FILTERS
SELECTION GUIDE

What is an EMI Filter?

An EMI filter is a device used to suppress and eliminate conducted electromagnetic energy that can cause the malfunction of critical aircraft control systems, complex medical devices and a various selection of sophisticated electronic equipment.

The EMI filters manufactured by Murata Erie are intended for use in low pass filtering applications.

Filters are constructed using capacitive and inductive elements. The capacitive elements used can either be of the tubular ceramic construction or the discoidal monolithic ceramic construction. The inductive elements used can be either ferrite beads, which have a very low current saturation threshold, or the torroidal core type that have a higher current saturation threshold.

Figures A and B illustrate what the filters look like using the above elements in the construction. There are typically two types of discrete line filters manufactured in Trenton, Ont., Canada.

Filter Capacitive Elements

A capacitor is an electrical charge storage device composed of conductive plates (electrodes) separated by a dielectric material. The capacitors used in the manufacturing of discrete EMI filters at Murata Erie are Barium Titanate based ceramic dielectrics offering a wide range of capacitance, voltage ratings and sizes.

The Barium Titanate is formulated in a number of ways to yield various characteristics, with relative dielectric constants (K values) ranging from 60 to 10,000. The dielectric constant achieved in any material occurs due to interactions between an applied electric field and localized charge centers within the dielectric. Charges are not transferred, but are instead displaced by the field, creating a polarized material which opposes the applied field. The extent to which a material may become polarized is greatly affected by temperature, DC bias, frequency and AC voltage.

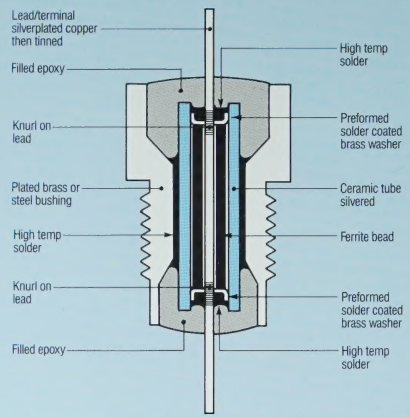


Fig. A This device commonly referred to as a "single," is constructed with a tubular ceramic capacitor in conjunction with a ferrite bead. This component is typically used in applications where the cutoff frequency is around 1-10MHz.

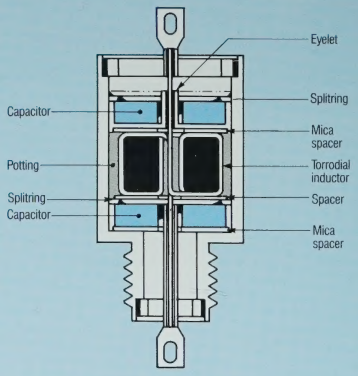
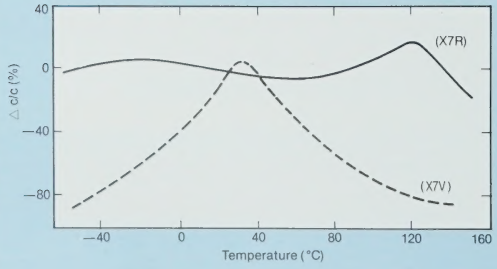


Fig. B This device is commonly referred to as a "coaxial" line filter. It is constructed using the discoidal monolithic capacitor along with a torroidal coil. This filter is typically used in applications where the desired cutoff frequency is in the DC to 150KHz range.

TEMPERATURE VS. CAPACITANCE AND DISSIPATION FACTOR—X7R, X7V



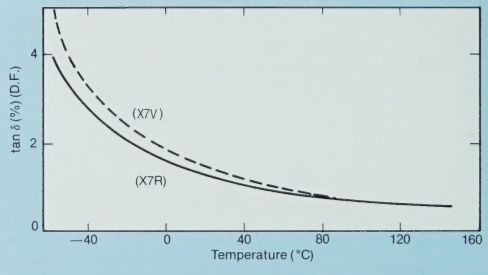


Fig. C

The following formula can be used to calculate the capacitance of a device with a simple geometry.

$$C = \frac{KA(N-1)}{t}$$

K = dielectric constant of material between electrodes.
A = total overlap area of dissimilar electrodes.
t = thickness of dielectric between electrodes.
N = number of plates or electrodes.

Temperature Coefficient (TC) Fig. C

Ceramic dielectrics exhibit variations in their dielectric constant across the normal operating temperature range. The TC is expressed as a percent capacitance change, or ppm/°C variance from the 25°C reference measurement. Murata Erie uses materials that have EIA specifications ranging from COG to X7V (See Table). Typical TC curves are shown in the following figures.

DC Voltage Coefficient Fig. E

Ceramic dielectrics will experience a decrease in dielectric constant or capacitance as the DC voltage is increased. This change is due to the restriction that voltage stress causes on the freedom of some of the polarization mechanisms. The voltage coefficient is generally more severe for very high K dielectrics and is also a function of the dielectric thickness (i.e. VDC/mil).

Insulation Resistance (IR)

The insulation resistance is a measure of a material's ability to resist DC leakage current. The value of insulation resistance is dependent upon surface effects, geometry and bulk dielectric resistivity. IR is also affected by temperature as illustrated in Fig. D.

TABLE
CLASS II DIELECTRICS EIA DESIGNATIONS
TEMPERATURE CHARACTERISTICS
DESCRIPTION

Lower Temperature Limit Reference	Upper Temperature Limit Reference	△C Limit Reference
+10 Z	+45 2	±1.0 A
−30 Y	+65 4	±1.5 B
−55 X	+85 5	±2.2 C
	+105 6	±3.3 D
	+125 7	±4.7 E
		±7.5 F
		±10 P
Example: Y5R		±15 R
△C=0±15% (25°C Ref.)		±22 S
from −30 to +85°C		+22-33 T
		+22-56 U
		+22-82 V

TEMPERATURE VS. INSULATION RESISTANCE

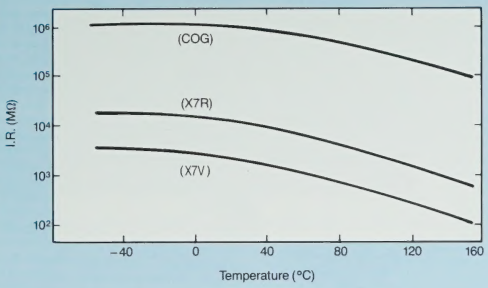


Fig. D

DC VOLTAGE VS. CAPACITANCE AND DISSIPATION FACTOR

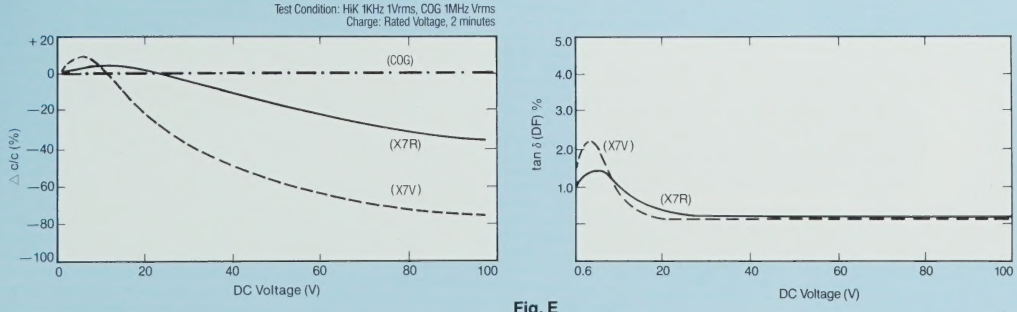


Fig. E

LOW PASS EMI FILTERS
SELECTION GUIDE

Capacitor Construction

The types of capacitors used in Murata Erie's filters are often referred to as feed-thru capacitors due to their physical geometry.

The simplest type is a ceramic tube that may have buried electrodes and can be constructed as a single capacitor or as two capacitors as used in a pi section filter. This type of device can have capacitance values from 10pF to 100,000pF typically and working voltage ratings as high as 2500VDC.

Due to the simple construction, these types of capacitors are very efficient at frequencies as high as 10GHz and exhibit no pronounced resonances.

Multi-layer monolithic discoidal capacitors are used for very high capacitance parts or for smaller filters where the required capacitance cannot be achieved by a ceramic tube. This type of capacitor consists of alternate layers of opposite polarity electrodes separated by a ceramic dielectric.

Capacitance values from 10pF to 10μF are available with working voltages as high as 400VDC.

The Importance of Impedance Matching

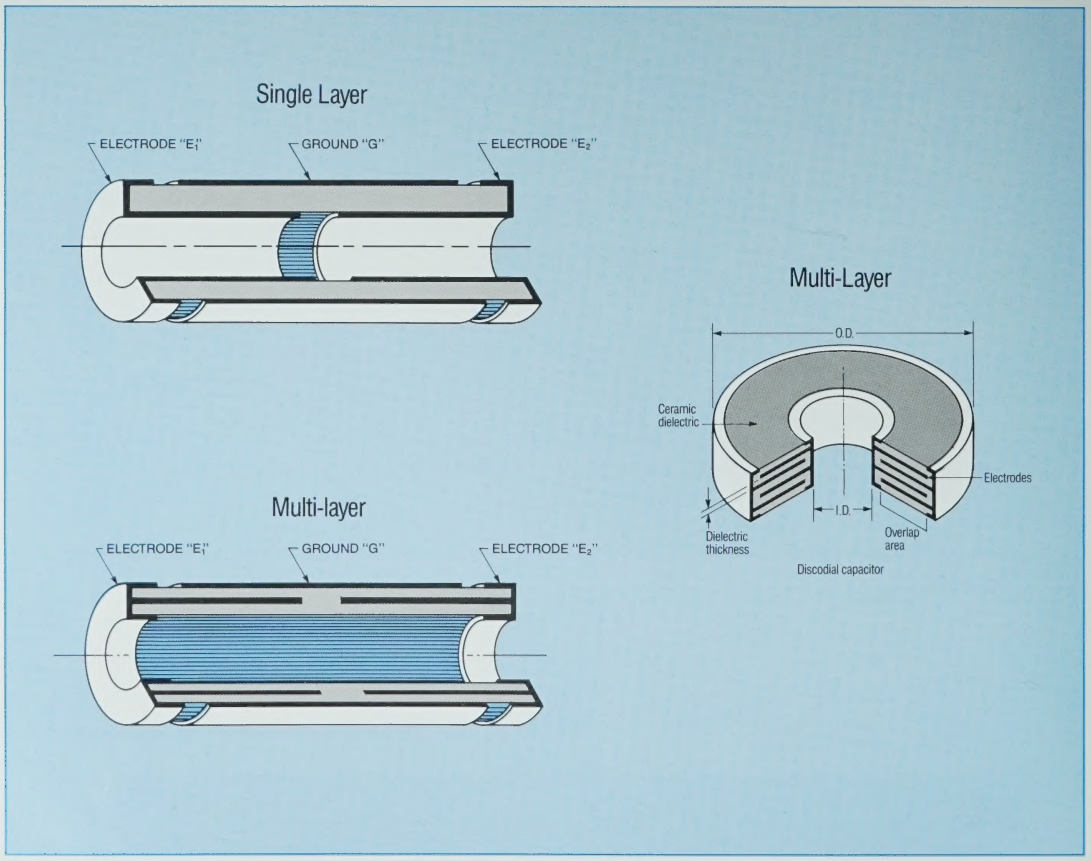
Your circuit impedance must always be considered when choosing an EMI filter. Impedance plays an important role in what type of circuit configuration should be used and the insertion loss you will obtain.

Q—What type of circuit configuration should I use in my system?

A—The rule of thumb is to ensure that the capacitor in the filter connects to a high impedance and that the inductive element in the filter connects to a low impedance. Use Fig. F to select the configuration type that matches your application.

Q—How will the impedance of my system affect the insertion loss of the filter I have chosen?

A—The insertion loss values listed in this catalog are measured in accordance with MIL-STD-220 in a 50ohm balanced system. If your circuit is not a balanced 50ohm system, the values of insertion loss you will obtain will be different from those listed herein.



LOW PASS EMI FILTERS
SELECTION GUIDE

In order to correlate the insertion loss figures listed in this catalog to your actual circuit conditions use the following formula:

$$\text{Insertion loss (dB)} = 20\text{LOG}\left[1 + \frac{Z_S Z_L}{Z_T(Z_S + Z_L)}\right]$$

where: Z_S = Source impedance in ohms.
Z_L = Load impedance in ohms.
Z_T = Transfer impedance in ohms from Fig. F

Example:

1. System impedance is 100ohms and 600ohms output.

2. Selected filter is 1214-001, which is 1,750pF and has an insertion loss of 50dB at 100MHz in a 50ohm system. Z_S = 100ohms, Z_L = 600ohms, Z_T = the transfer impedance is taken from Fig. F and in this case the insertion loss is 50dB therefore the Z = 0.08ohms.

$$\text{Insertion loss (dB)} = 20\text{LOG}\left[1 + \frac{Z_S Z_L}{Z_T(Z_S + Z_L)}\right]$$

$$\text{I.L. (dB)} = 20\text{LOG}\left[1 + \frac{100 \times 600}{0.08\,(100 + 600)}\right]$$

I.L. (dB) = 20LOG 1072

I.L. (dB) = 60.6

As can be seen, the 1214-001 will produce 60dB in the 100/600ohm system @ 100MHz.

Selection of a Filter

1. Refer to chart on inside of cover to determine what style of filter offers suitable insertion loss in the frequency bands desired.

2. Find the series that is rated at the desired voltage. Take care in matching the proper temperature range with the appropriate rated voltage.
*A/C applications: use only the M/E line of AC line filters designed for use in 125/240 VAC systems.

3. Select a filter having a current rating equal to or greater than that required in your application. (Note: Murata Erie filters are designed to meet the current overload requirements of MIL-F-15733—1.4 times rated current for 15 minutes.)

4. Within the voltage/temperature/current ratings, choose an insertion loss curve which best matches your needs, bearing in mind the matching of impedance.

5. Choose a mechanical style best suited to your application. Our filters are available in either a threaded mount, eyelet and sleeve or solder-in style. Detailed mechanical dimensions are listed for each type. Also, be sure to read the section on installation procedures.
Note: Transient suppression and AC line types are thread mount only.

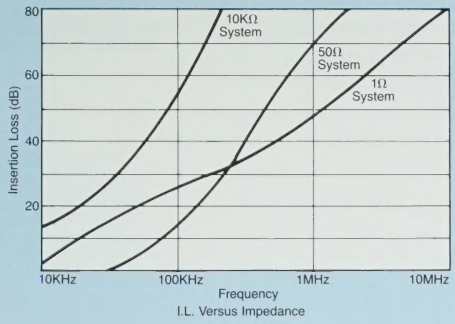
6. Select the Murata/Erie part number corresponding to your chosen criteria. Use the conversion chart if necessary for QPL rated parts. Use the telephone numbers or address on the back cover to obtain additional technical information, pricing, or for order placement.

7. In order to assist the applications and design engineers in the suitable selection of an EMI/RFI filter, Murata Erie offers a Hi-Reliability Sample Kit found on page 22.

I/O IMPEDANCE AND SELECTION CRITERIA

Input Impedance (Z)	Circuit Type	Output Impedance (Z)
HIGH	C Type	HIGH
	π Type	
	L Type	LOW
LOW	T Type	
	L Type	HIGH

Fig. F



I.L. Versus Impedance

This graph displays insertion loss vs. frequency of a typical pi filter used in three different circuits. Each circuit represents a system with a different impedance.

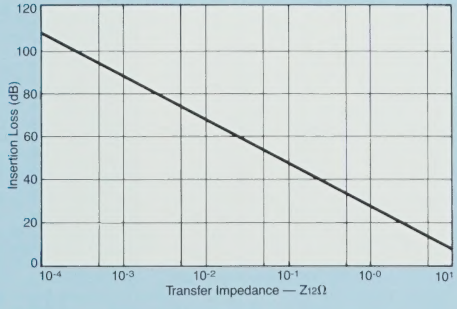
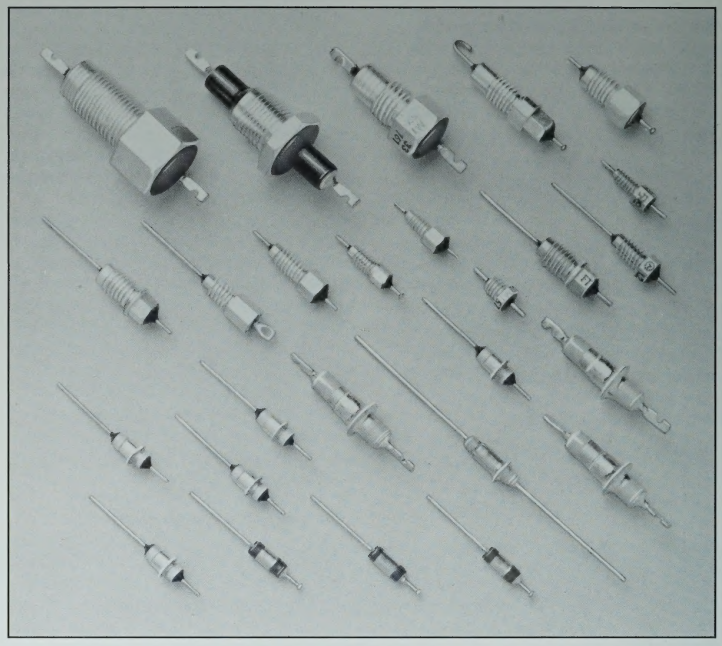


Fig. G

LOW PASS EMI FILTERS
SOLDER-IN MOUNT SINGLES

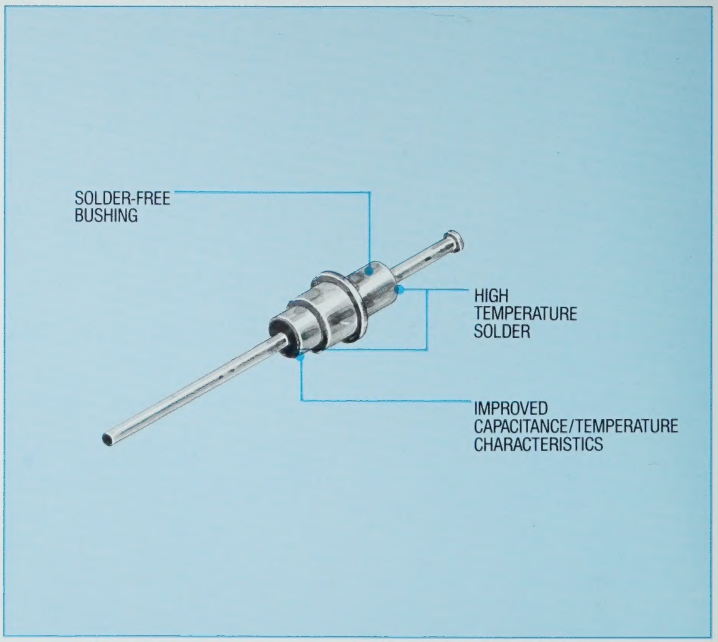
Improved manufacturing techniques vastly improve the performance of Murata Erie's EMI/RFI solder-in filter line described on the following pages. These filters now offer a higher voltage withstanding capability and a greater capacitance vs. temperature stability than ever before possible. Mechanical reliability is also greatly enhanced by the use of high temperature solder that prevents reflow during soldering operations. High temperature solder is also employed to secure the ceramic tube to the center lead and again preventing any possible reflow.



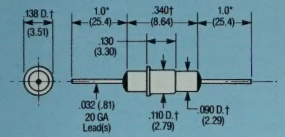
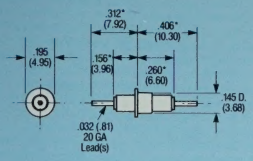
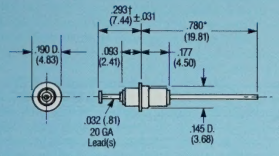
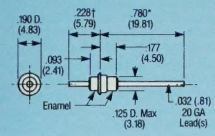
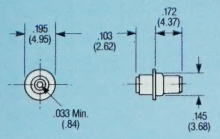
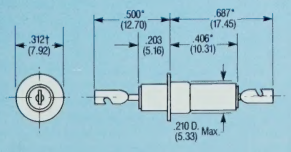
FEATURES

- **High temperature solder prevents potential solder reflow during installation.**
- **Silver plated eyelet assures mounted perpendicularity.**
- **State-of-the-art use of ceramic material increase voltage-temperature capabilities.**
- **Lower dielectric constant ceramic increases attenuation performance at temperature extremes.**
- **Higher working voltages.**
- **Secured ferrite beads.**
- **No potting necessary on leads.**

TYPICAL CONSTRUCTION



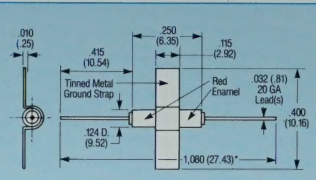
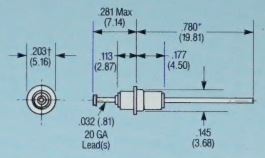
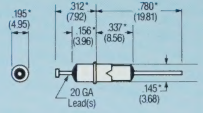
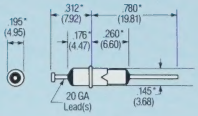
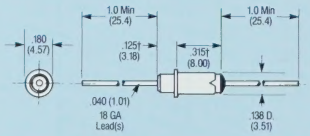
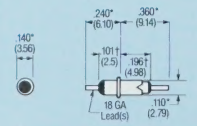
LOW PASS EMI FILTERS
PI SECTION
SOLDER-IN MOUNT SINGLES

DIMENSIONS: in. (mm)	Part No.*	Q.P.L. Equiv.	Min. Cap. (pF)	Voltage Rating (VDC)		Current IDC (A)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB)			
				85°C	125°C		10 MHz	100 MHz	1 GHz	10 GHz
	1251-001	—	1500	350	200	10	5	40	70	70
	1203-050	*	1500	350	200	10	5	45	70	70
	1214-001	*	1750	250	125	10	5	50	60	60
	1214-029	*	1750	250	125	10	5	50	60	60
	1214-007	*	1750	250	125	10	5	35	60	60
	1204-050	*	3000	700	500	25	8	50	70	70

†: ±.015 (.38)
*: ±.031 (.79)

*Q.P.L. Parts must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

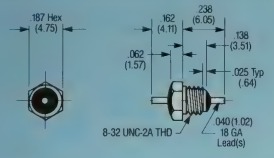
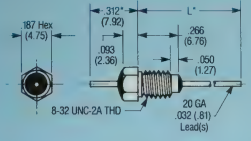
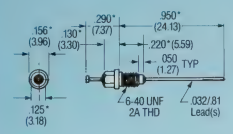
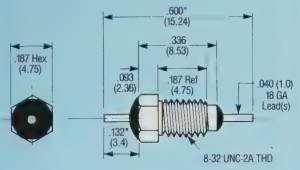
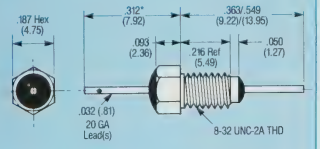
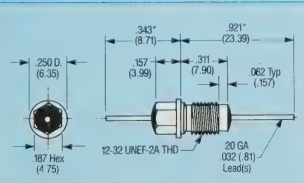
LOW PASS EMI FILTERS
PI SECTION
SOLDER-IN MOUNT SINGLES

DIMENSIONS: in. (mm)	Part No.*	Q.P.L. Equiv.	Min. Cap. (pF)	Voltage Rating (VDC)		Current IDC (A)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB)			
				85°C	125°C		10 MHz	100 MHz	1 GHz	10 GHz
	1234-001	*	.012μF	100	70	10	25	70	65	65
	1234-000	*	.012μF	100	70	10	25	70	65	65
	1203-089	*	5000pF	200	100	10	20	65	70	70
	1233-000	—	.022μF	100	70	10	35	70	70	70
	1217-000	*	3000	350	200	10	8	55	65	65
	1217-010	*	8000	250	100	10	18	68	70	70
	1223-012	*	3000	125	50	15	7	50	65	60
	1223-014	*	1500	350	200	15	5	25	60	60

†: ±.015 (.38)
*: ±.031 (.79)

*Q.P.L. Parts must be ordered by Military Part Number.
Hardware dimensions and torque specifications are on page 27.
See Q.P.L. Cross Reference, pages 28-30.

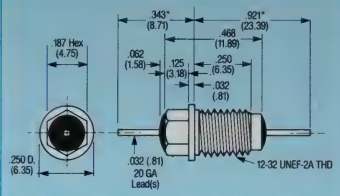
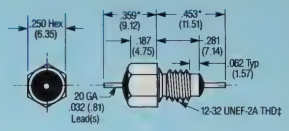
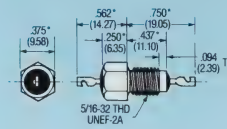
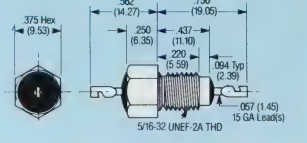
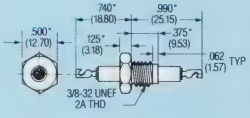
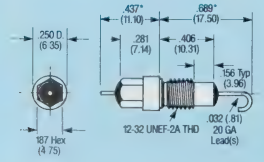
LOW PASS EMI FILTERS
PI SECTION
BUSHING MOUNT SINGLES

DIMENSIONS: in. (mm)	Part No.*	Q.P.L. Equiv.	Min. Cap. (pF)	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	Current IDC (A)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB) 10 MHz	100 MHz	1 GHz	10 GHz
	**1250-059**	—	1500	250	125	15	5	35	60	60
	**1250-003** L=.891 (26.6)	*	1500	200	100	10	5	45	65	60
	1250-049 L=.578 (14.7)	*	1500	200	100	10	5	45	65	60
	**1289-001**	—	1500	200	200	10	5	40	60	60
	1289-004	—	3000	300	200	10	8	50	70	70
	**1250-062**	*	3000	185	125	15	10	30	65	65
	**1250-054**	*	5000	100	70	10	20	65	70	70
	**1270-009**	*	1500	350	200	10	5	45	70	70
	1270-024 D=.235 (5.97)	*								
	1270-016	*	5000	200	100	10	20	65	70	70
	1270-025 D=.235 (5.97) No Hardware	*								

†: ±.015 (.38)
*: ±.031 (.79)

*Q.P.L. Parts must be ordered by Military Part Number.
Hardware dimension and torque specifications are on page 27.
See Q.P.L. Cross Reference, pages 28-30.

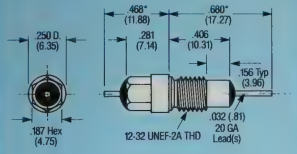
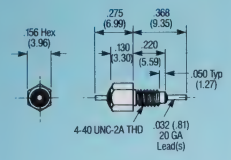
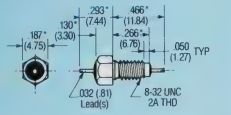
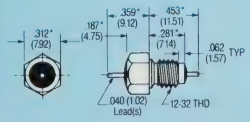
LOW PASS EMI FILTERS
PI SECTION
BUSHING MOUNT SINGLES

DIMENSIONS: in. (mm)	Part No.*	Q.P.L. Equiv.	Min. Cap. (pF)	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	Current IDC (A)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB) 10 MHz	100 MHz	1 GHz	10 GHz
	**1270-101**	*	5000	200	100	10	15	65	70	70
	**1201-054**	*	1500	350	200	10	5	45	70	70
	1201-052† 12-28 THD	*								
	1201-086† 12-28 THD	—	2500	500	350	10	5	50	65	65
	1201-066	—	5500	200	100	10	20	68	70	70
	**1202-005**	—	2000	1000	700	25	5	50	65	65
	1202-052 5/16-24 THD	—	3000	500	500	25	10	55	70	70
	1202-054	—								
	**1202-076** 5/16-24 THD	*	3000	700	500	25	10	55	70	70
	1202-075	*	4000	700	500	25	15	55	70	70
	**1280-060**	—	1500	2500	2000	25	5	50	50	50
	**1221-001**	*	4000	500	300	10	15	65	70	70

†: ±.015 (.38)
*: ±.031 (.79)

*Q.P.L. Parts must be ordered by Military Part Number.
Hardware dimensions and torque specifications are on page 27.
See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
PI and C SECTION
BUSHING MOUNT SINGLES and COAXIALS

DIMENSIONS: in. (mm)	Part No.*	Style	Q.P.L. Equiv.	Min. Cap. (pF)	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	Current IDC (A)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB) 1 MHz	10 MHz	100 MHz	1 GHz	10 GHz
	1293-000	Pi	—	.012μF	200	125	10	5	28	65	70	70
	1293-001	Pi	—	.028μF	100	70	10	10	38	75	75	75
	1216-001	Pi	—	.050μF	100	70	10	15	60	75	75	75
	1216-003	Pi	*	.012μF	100	70	10	5	45	75	75	75
	9900-381-6006	C	—	45000	50	35	10	14	30	45	55	60
	9900-381-6004	C	—	5000	70	50	10	—	15	30	45	55
	9900-381-6026	C	—	31000	70	50	10	12	25	40	55	60
	9900-381-6005	C	—	15000	100	70	10	7	20	35	50	60
	9900-381-6013	C	—	2700	150	100	10	—	10	25	40	50
	9900-381-6020	C	—	100	300	200	10	—	—	3	20	28
	9900-381-6021	C	—	500	300	200	10	—	—	15	35	40
	9900-381-6022	C	—	1200	300	200	10	—	5	20	35	45
	9950-381-6009	C	—	120000	70	50	10	20	43	55	55	55
	9950-381-6008	C	—	80000	100	70	10	15	37	51	55	55
	9950-381-6007	C	—	50000	140	100	10	13	29	37	44	55
	9910-381-6004	C	—	1μF	50	35	15	38	52	70	78	80
	9910-381-6003	C	—	750000	70	50	15	35	51	61	65	70
	9910-381-6002	C	—	300000	125	100	15	28	45	55	60	65
	9910-381-6001	C	—	100000	175	125	15	15	37	51	55	60

†: ±.015 (.38)
*: ±.031 (.79)

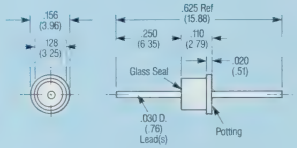
*Q.P.L. Parts must be ordered by Military Part Number.
Hardware dimensions and torque specifications are on page 27.
See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
COAXIAL TYPES

Murata Erie offers an extensive line of coaxial filters in "C," "L," "Pi" and "T" circuit configurations meeting all applicable MIL, QPL and commercial standards. An extremely wide range of designs with frequency, impedance and attenuation characteristics are included so that virtually every application requirement can be met with standard units. Custom designed filters for special applications are also available. Contact our Application Engineering group for design assistance.

NOTE:
Standard thread length for all coaxial type filters is .190 (4.83). .312 (7.93) thread length is also available.

C TYPE SOLDER-IN MOUNT

DIMENSIONS: in. (mm)	Murata Erie Part No.	Min. Cap. (pF)	Voltage Rating (VDC)		IDC (A)	Minimum Insertion Loss from 55°C to 125°C			
			85°C	125°C		10 MHz	100 MHz	1 GHz	10 GHz
	**9900-001-6004**	5000	70	50	5	15	30	45	55
	9900-001-6054*								
	9900-001-6104 CK99BW502M	5000 ±20%	70	50	5	15	30	45	55
	9900-001-6013	2700	150	100	5	10	25	40	50
	9900-001-6063*								
	9900-001-6113 CK99BW272M	2700 ±20%	150	100	5	10	25	40	50
	9900-001-6022	1200	300	200	5	5	20	35	45
	9900-001-6072*								
	9900-001-6122 CK99BW122M	1200 ±20%	300	200	5	5	20	35	45
	9900-001-6021	500	300	200	5	—	15	35	40
	9900-001-6071*								
	9900-001-6121 CK99BW501M	500 ±20%	300	200	5	—	15	35	40
	9900-001-6020	100	300	200	5	—	3	20	28
	9900-001-6070*								
	9900-001-6120 CK99BW101M	100 ±20%	300	200	5	—	3	20	28

Installation Temp: 280°C/536°F max.

Hermetic glass seal available on either end

All CK 99 parts are qualified to MIL-C-11015

*[illegible] glass seal on opposite end.

LOW PASS EMI FILTERS
L SECTION–COAXIAL STYLE
BUSHING MOUNT

DIMENSIONS: in. (mm)

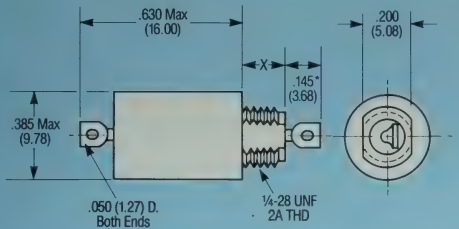


Fig. 1
9060 SERIES
HERMETIC SEALS

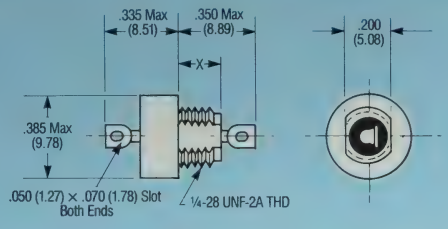


Fig. 3
9051 SERIES
HERMETIC SEALS

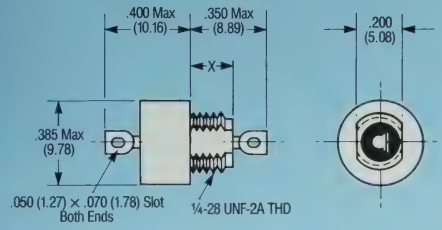


Fig. 2
9053 SERIES
HERMETIC SEALS

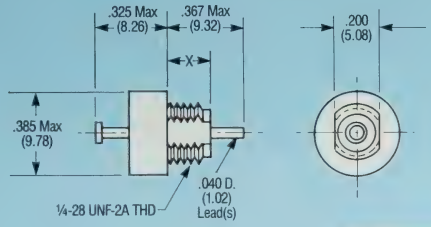
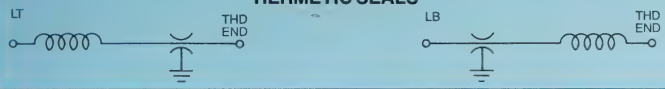


Fig. 4
9050 SERIES
EPOXY SEALS



THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

*Tol.=±.045 (±1.1)
All Tolerances: ±.010 (±.25)

Murata Erie Part No.	Type	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	Typical Weight (g)	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 15 KHz	30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9050-100-0014	LB	80	50	2.5	15	1.4	500	.005	—	15	25	34	44	60	70
9051-100-0011	LB	80	50	3	15	1.4	500	.005	—	15	25	34	44	60	70
9053-100-0001	LB	80	50	3.5	15	1.4	500	.005	—	15	25	34	44	60	70
9050-100-0000	LB	80	50	2.5	15	1.2	100	.005	—	4	12	21	32	50	70
9051-100-0000	LB	80	50	3	15	1.2	100	.005	—	4	12	21	32	50	70
9050-100-0008	LB	100	70	2.5	15	.7	1000	.005	—	9	20	29	39	52	70
9051-100-0008	LB	100	70	3	15	.7	1000	.005	—	9	20	29	39	52	70
9053-100-0008	LB	100	70	3	15	.7	1000	.005	—	9	20	29	39	52	70
9050-100-0012	LB	150	100	2.5	15	.3	1000	.005	—	4	12	21	31	48	70
9053-100-0002	LB	150	100	3.5	15	.3	1000	.005	—	4	12	21	31	48	70
9050-100-0011	LB	280	200	2.5	15	.15	1000	.005	—	—	7	15	25	40	60
9053-100-0006	LB	280	200	3.5	15	.15	1000	.005	—	—	7	15	25	40	60
*9060-100-0010 *9060-100-0000	LT LB	100	70	7.5	.1	.95	1000	1.7	9	20	39	58	70	70	70
*9060-100-0011 *9060-100-0001	LT LB	100	70	7.5	.3	.75	1000	.75	6	15	33	52	70	70	70
*9060-100-0012 *9060-100-0002	LT LB	100	70	7.5	.5	.7	1000	.36	5	12	27	46	67	70	70
*9060-100-0013 *9060-100-0003	LT LB	100	70	7.5	1	.7	1000	.14	5	11	19	34	53	70	70
*9060-100-0014 *9060-100-0004	LT LB	100	70	7.5	2	.7	1000	.07	5	10	18	30	46	70	70

*Q.P.L. Parts must be ordered by Military Part Number.

Hardware dimensions and torque specifications are on page 27.
See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
C TYPE COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)

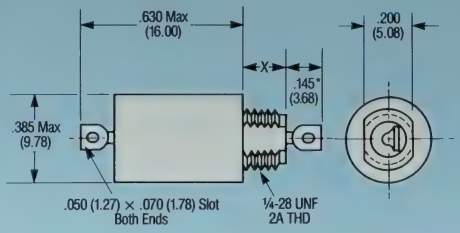


Fig. 1

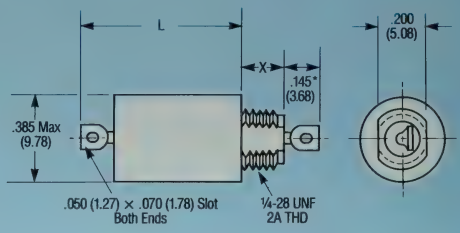


Fig. 2

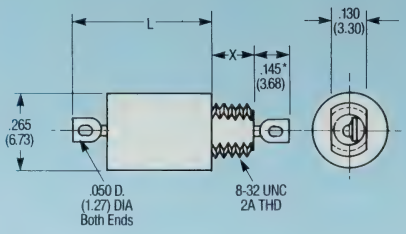


Fig. 3

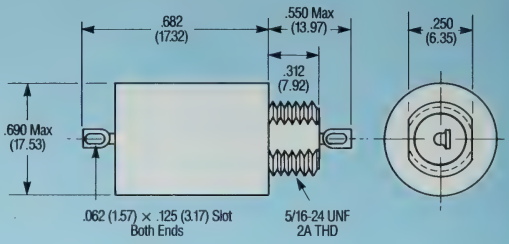


Fig. 4

THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

*Tol.=±.045 (±1.1)

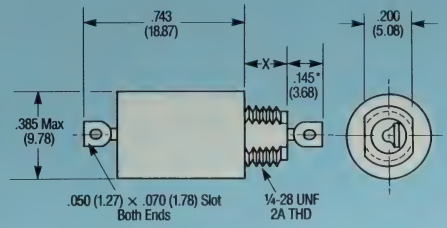
All Tolerances: ±.010 (±.25)

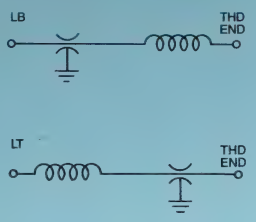
Murata Erie Part No.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	Voltage Rating (VAC) 400 Hz 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Fig.	Max. L (In.)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9923-100-6001	60	50	—	15	2.2	250	2	.576	—	—	42	52	65	70
9913-101-6000 MIL-C-83439/01-002	80	50	—	15	1.4	1000	1	.630	15	26	33	44	60	70
9923-100-6000	125	100	—	15	.99	500	2	.576	—	—	31	41	50	65
9920-100-6000	150	100	—	15	.33	1000	2	.387	4	13	21	31	50	60
9911-100-6003 MIL-C-83439/01-001	175	125	—	15	.3	1000	1	.630	3	12	20	30	50	70
9900-100-6002	175	125	—	10	.017	1000	3	.380	—	—	1	7	24	60
9901-100-6003	175	125	—	10	.057	1000	3	.470	—	—	7	16	33	60
9920-100-6002	200	150	125	15	.15	500	2	.387	—	—	12	20	41	65
9922-100-6004	250	180	125	15	.1	1000	2	.464	—	6	15	26	42	70
9924-100-6004	250	180	125	15	.062	1000	2	.658	—	—	9	19	34	70
9923-100-6002	280	200	—	15	.3	1000	2	.576	—	12	21	30	42	60
9923-100-6004	450	300	240	15	.044	1000	2	.576	—	—	5	13	25	60
9932-100-6000	200	150	—	15	1.26	1000	4	.682	8	20	34	45	50	65
9932-100-6004	200	150	—	15	2.1	1000	4	.682	10	29	39	50	60	65
9932-100-6005	450	300	240	15	.21	1000	4	.682	—	10	18	27	45	60

*Maximum DC Series resistance will be .005 for all designs.

LOW PASS EMI FILTERS
L SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)





THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

*Tol.=±.045 (±1.1)

All Tolerances: ±.010 (±.25)

Murata Erie Part No.	Type	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9000-100-0001 9000-100-0031	LT LB	100	70	.5	.75	1000	.6	13	29	48	66	70	70
9000-100-0003 9000-100-0032	LT LB	100	70	1	.75	1000	.25	10	22	39	56	70	70
9000-100-0005 9000-100-0154	LT LB	100	70	3	.75	1000	.06	10	20	30	45	70	70
9000-100-0007 9000-100-0021	LT LB	100	70	5	.75	1000	.015	10	20	29	39	70	70
9000-100-0153 9000-100-0155	LT LB	100	70	10	.75	1000	.005	10	19	28	38	55	70
9000-100-0161 9000-100-0170	LT LB	150	100	.5	.33	1000	.6	6	22	41	62	70	70
9000-100-0162 9000-100-0171	LT LB	150	100	1	.33	1000	.25	—	16	32	50	70	70
9000-100-0163 9000-100-0176	LT LB	150	100	3	.33	1000	.06	—	13	21	37	66	70
9000-100-0168 9000-100-0177	LT LB	150	100	5	.33	1000	.015	—	13	20	32	60	70
9000-100-0169 9000-100-0178	LT LB	150	100	10	.33	1000	.005	5	12	21	31	48	70
9000-100-0023 9000-100-0052	LT LB	280	200	.5	.15	1000	.6	—	16	36	56	70	70
9000-100-0116 9000-100-0179	LT LB	280	200	1	.15	1000	.25	—	8	26	46	70	70
9000-100-0062 9000-100-0011	LT LB	280	200	3	.15	1000	.06	—	7	16	31	66	70
9000-100-0117 9000-100-0180	LT LB	280	200	5	.15	1000	.015	—	7	15	25	59	70
9000-100-0114 9000-100-0181	LT LB	280	200	10	.15	1000	.005	—	8	15	24	40	70
*9000-100-0024 *9000-100-0025	LT LB	250 VDC 125 VRMS 400 Hz	180 VDC 125 VRMS 400 Hz	.5	.2	1000	.06	—	18	38	58	70	70
*9000-100-0026 *9000-100-0037	LT LB			1	.2	1000	.25	—	12	29	48	70	70
*9000-100-0028 *9000-100-0047	LT LB			3	.2	1000	.06	—	9	17	33	65	70
*9000-100-0030 *9000-100-0048	LT LB			5	.2	1000	.015	—	9	17	28	61	70
9000-100-0098 9000-100-0099	LT LB			10	.2	1000	.005	—	9	17	27	44	60

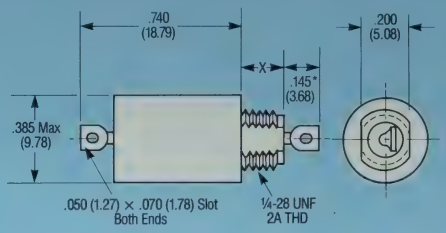
*Q.P.L. Part must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

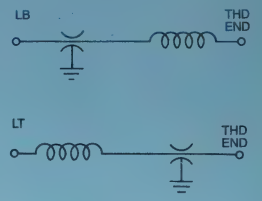
Typical Weight: 8.5 g

Hardware dimensions and torque specifications are on page 27.

LOW PASS EMI FILTERS
L SECTION–COAXIAL HERMETIC STYLE
BUSHING MOUNT

DIMENSIONS: in. (mm)





THD LGTH ×	P/N CTR No.
.190 (4.83)	300
.312 (7.93)	303

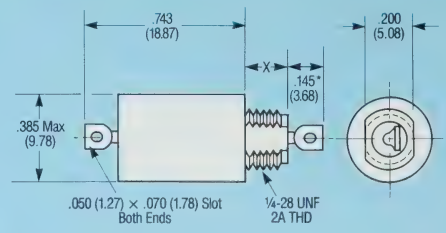
Plating: Silver per QQ-S-365

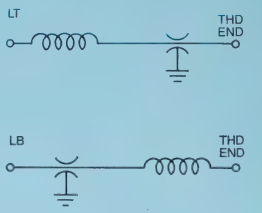
*Tol.=±.045 (±1.1)

All Tolerances: ±.010 (±.25)

Murata Erie Part No.	Type	Typical Weight (g)	Murata Erie Part No. Thread Length X=.312	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss at 25°C per MIL-STD-220 (dB) 30 KHz	150 KHz	300 KHz	1 MHz	10 MHz
*9215-300-0028 *9200-300-0028	LT LB	8	9215-303-0098 9200-303-0098	50	35	.06	1.2	100	70	44	70	70	70	70
*9215-300-0023 *9200-300-0023	LT LB	8	9215-303-0093 9200-303-0093	50	35	.15	1.2	100	12	24	52	64	70	70
*9215-300-0024 *9200-300-0024	LT LB	8	9215-303-0094 9200-303-0094	50	35	.25	1.2	100	4	18	42	56	70	70
*9215-300-0021 *9200-300-0021	LT LB	8	9215-303-0091 9200-303-0091	50	35	.30	1.2	100	2.3	16	35	44	62	70
*9215-300-0022 *9200-300-0022	LT LB	8	9215-303-0092 9200-303-0092	50	35	.45	1.2	100	1.2	15	31	37	55	70
*9215-300-0025 *9200-300-0025	LT LB	8	9215-303-0095 9200-303-0095	50	35	10	1.2	100	.01	15	28	33	44	60

DIMENSIONS: in. (mm)





THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

Plating: Silver per QQ-S-365

*Tol.=±.045 (±1.1)

All Tolerances: ±.010 (±.25)

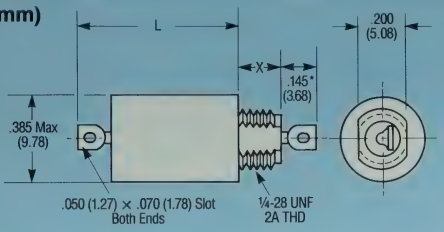
Murata Erie Part No.	Type	Typical Weight (g)	Murata Erie Part No. Thread Length X=.312	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	150 KHz	300 KHz	1 MHz	10 MHz
*9000-100-0012 *9000-100-0046	LT LB	8.5	9000-103-0012 9000-103-0046	150	100	.5	.6	400	1.5	—	35	46	67	70
*9000-100-0015 *9000-100-0045	LT LB	8.5	9000-103-0015 9000-103-0045	150	100	1	.6	400	.25	—	22	33	54	70
*9000-100-0019 *9000-100-0036	LT LB	8.5	9000-103-0019 9000-103-0036	150	100	5	.6	400	.015	—	16	22	34	68

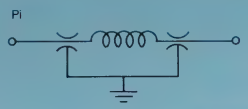
Hardware dimensions and torque specifications are on page 27.

*Q.P.L. Parts must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
PI SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)





THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

Typical Weight: 8.5g
Finish: Tin
All Tolerances: ±.010 (±.25)
NOTE: Available in silver or gold finish upon request.

*Tol.=±.045 (±1.1)

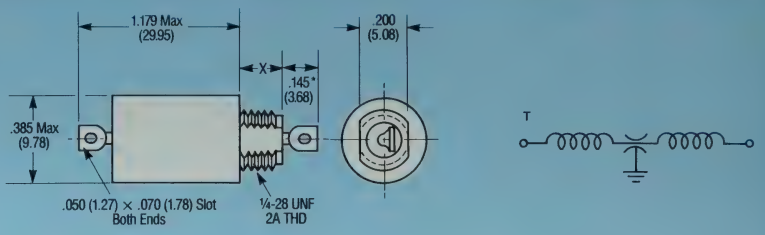
Murata Erie Part No.	Q.P.L. Equiv.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	L Dim.	IDC (A)	Min. Cap (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9001-100-1077	—	80 VDC	50 VDC	.793	.5	2.8	200	.6	36	68	80	80	80	80
9001-100-1078	—			.793	1	2.8	200	.25	23	58	80	80	80	80
9001-100-1079	—			.793	3	2.8	200	.06	—	40	70	80	80	80
9001-100-1080	—			.793	5	2.8	200	.015	—	18	60	80	80	80
9001-100-1081	—			.793	10	2.8	200	.005	21	32	40	50	68	80
9061-100-1000	*	100 VDC	70 VDC	.730	.1	1.4	500	1.7	33	65	80	80	80	80
9061-100-1001	*			.730	.3	1.4	500	1.75	29	60	80	80	80	80
9061-100-1002	*			.730	.5	1.4	500	.36	21	54	78	80	80	80
9001-100-1040	—			.793	.5	1.4	500	.6	23	57	80	80	80	80
9061-100-1003	*			.730	1	1.4	500	.14	—	39	69	80	80	80
9001-100-1041	—			.793	1	1.4	500	.25	3	47	75	80	80	80
9061-100-1004	*			.730	2	1.4	500	.07	—	31	63	80	80	80
9001-100-1043	—			.793	3	1.4	500	.06	—	25	58	80	80	80
9001-100-1045	—			.793	5	1.4	500	.015	—	12	48	80	80	80
9001-100-1082	—			.793	10	1.4	500	.005	15	26	35	44	62	80
9001-100-1010	*	150 VDC	100 VDC	.793	.5	.66	1000	.6	6	39	68	80	80	80
9001-100-1013	*			.793	1	.66	1000	.25	—	28	59	80	80	80
9001-100-1015	*			.793	3	.66	1000	.06	—	5	41	74	80	80
9001-100-1017	*			.793	5	.66	1000	.015	—	—	26	63	80	80
9001-100-1083	—			.793	10	.66	1000	.005	8	18	27	38	58	80
9001-100-1068	—	280 VDC	200 VDC	.793	.5	.3	1000	.6	—	27	56	80	80	80
9001-100-1069	—			.793	1	.3	1000	.25	—	14	46	76	80	80
9001-100-1058	—			.793	3	.3	1000	.06	—	8	28	61	80	80
9001-100-1070	—			.793	5	.3	1000	.015	—	—	—	51	80	80
9001-100-1084	—			.793	10	.3	1000	.005	—	11	20	31	50	80
9001-100-1009	—	250 VDC 125 VRMS @ 400Hz	180 VDC 125 VRMS @ 400Hz	.793	.5	.044	1000	.6	—	5	25	54	80	80
9001-100-1064	—			.793	1	.044	1000	.25	—	—	13	45	80	80
9001-100-1065	—			.793	3	.044	1000	.06	—	—	—	27	80	80
9001-100-1066	—			.793	5	.044	1000	.015	—	—	—	10	75	80
9001-100-1086	—			.793	10	.044	1000	.005	—	—	5	14	34	70
9001-100-1018	*			.793	.5	.2	1000	.6	—	21	49	80	80	80
9001-100-1021	*			.793	1	.2	1000	.25	—	5	39	70	80	80
9001-100-1023	*			.793	3	.2	1000	.06	—	—	10	51	80	80
9001-100-1025	*			.793	5	.2	1000	.015	—	—	—	43	80	80
9001-100-1085	—			.793	10	.2	1000	.005	—	9	18	28	45	75

*Q.P.L. Parts must be ordered by Military Part Number.
See Q.P.L. Cross Reference, pages 28-30.

Hardware dimensions and torque specifications are on page 27.

LOW PASS EMI FILTERS
T SECTION–COAXIAL HERMETIC STYLE
BUSHING MOUNT

DIMENSIONS: in. (mm)



THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

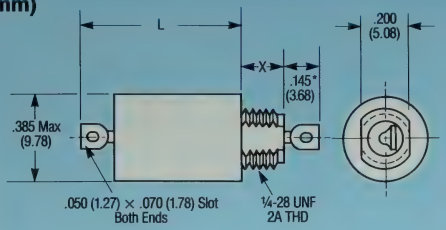
Typical Weight 10g
All Tolerances: ±.010 (±.25)

*Tol.=±.045 (±1.1)

Murata Erie Part No.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9004-100-2014	80 VDC	50 VDC	1	1.4	500	.5	16	34	56	75	75	75
9004-100-2015			2	1.4	500	.09	15	26	37	61	75	75
9004-100-2016			4	1.4	500	.03	15	26	34	47	75	75
9004-100-2017			10	1.4	500	.005	17	27	34	44	60	75
9004-100-2018	100 VDC	70 VDC	1	.75	1000	.5	10	25	49	75	75	75
9004-100-2019			2	.75	1000	.09	10	19	32	56	75	75
9004-100-2020			4	.75	1000	.03	10	19	29	42	75	75
9004-100-2021			10	.75	1000	.005	9	19	28	39	58	75
9004-100-2011	150 VDC	100 VDC	1	.33	1000	.5	3	17	42	72	75	75
9004-100-2012			2	.33	1000	.09	—	12	24	48	75	75
9004-100-2013			4	.33	1000	.03	—	12	21	34	75	75
9004-100-2022			10	.33	1000	.005	3	12	21	31	50	75
9004-100-2023	300 VDC	200 VDC	1	.15	1000	.5	—	10	36	66	75	75
9004-100-2024			2	.15	1000	.09	—	6	18	41	75	75
9004-100-2025			4	.15	1000	.03	—	7	15	27	70	75
9004-100-2026			10	.15	1000	.005	—	8	15	25	45	75
9004-100-2030			1	.022	1000	.5	—	—	16	51	75	75
9004-100-2031			2	.022	1000	.09	—	—	—	24	75	75
9004-100-2032			4	.022	1000	.03	—	—	—	10	60	75
9004-100-2033			10	.022	1000	.005	—	—	—	9	26	75
9004-100-2028	230 VDC 125 VAC	180 VDC 125 VAC	1	.1	1000	.5	—	7	32	64	75	75
9004-100-2029			2	.1	1000	.09	—	—	14	34	75	75
9004-100-2010			4	.1	1000	.03	—	—	—	25	70	75
9004-100-2027			10	.1	1000	.005	—	5	11	21	41	75

TRANSIENT SUPPRESSION
EMI FILTERS–COAXIAL HERMETIC STYLE
PI and T SECTION–BUSHING MOUNT

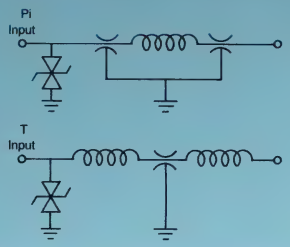
DIMENSIONS: in. (mm)



THD LGTH ×	P/N CTR No.
.190 (4.83)	100
.312 (7.93)	103

*Tol.=±.045 (±1.1)

All Tolerances: ±.010 (±.25)



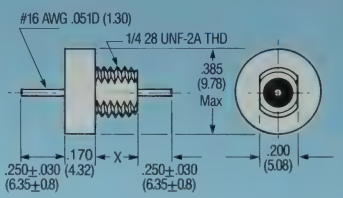
Murata Erie Part No.	Type	Typical Weight (g)	Max. L (in.)	Voltage Rating (VDC)	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	VR* (VDC)	BV* (VDC)	IT* (mA)	IPP* (A)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB)					
													30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9004-100-7100	Pi	10	1.179	5	.5	1.4	.5	.6	6.5	7.22/7.98	10	44.7	23	57	80	80	80	80
9004-100-7101	Pi	10	1.179	5	1	1.4	.5	.25	6.5	7.22/7.98	10	44.7	3	47	75	80	80	80
9004-100-7102	Pi	10	1.179	5	3	1.4	.5	.06	6.5	7.22/7.98	10	44.7	—	23	58	80	80	80
9004-100-7103	Pi	10	1.179	5	5	1.4	.5	.015	6.5	7.22/7.98	10	44.7	—	17	48	80	80	80
9004-100-7104	Pi	10	1.179	5	10	1.4	.5	.005	6.5	7.22/7.98	10	44.7	16	26	35	46	60	80
9005-100-7200	T	15	1.345	5	1	.7	.5	.05	6.5	7.22/7.98	10	44.7	10	26	50	75	75	75
9005-100-7201	T	15	1.345	5	2	.7	.5	.09	6.5	7.22/7.98	10	44.7	10	20	32	56	75	75
9005-100-7202	T	15	1.345	5	4	.7	.5	.025	6.5	7.22/7.98	10	44.7	10	20	29	42	75	75
9005-100-7203	T	15	1.345	5	10	.7	.5	.005	6.5	7.22/7.98	10	44.7	10	20	28	39	58	75
9004-100-7105	Pi	10	1.179	28	.5	1.4	30	.6	33	36.7/40.6	1	9.4	23	57	80	80	80	80
9004-100-7106	Pi	10	1.179	28	1	1.4	30	.25	33	36.7/40.6	1	9.4	3	47	75	80	80	80
9004-100-7107	Pi	10	1.179	28	3	1.4	30	.06	33	36.7/40.6	1	9.4	—	23	58	80	80	80
9004-100-7108	Pi	10	1.179	28	5	1.4	30	.015	33	36.7/40.6	1	9.4	—	17	48	80	80	80
9004-100-7109	Pi	10	1.179	28	10	1.4	30	.005	33	36.7/40.2	1	9.4	16	26	35	46	60	80
9005-100-7204	T	15	1.345	28	1	.7	30	.05	33	36.7/40.2	1	9.4	10	26	50	75	75	75
9005-100-7205	T	15	1.345	28	2	.7	30	.09	33	36.7/40.2	1	9.4	10	20	32	56	75	75
9005-100-7206	T	15	1.345	28	4	.7	30	.025	33	36.7/40.2	1	9.4	10	20	29	42	75	75
9005-100-7207	T	15	1.345	28	10	.7	30	.005	33	36.7/40.2	1	9.4	10	20	28	39	58	75
9004-100-7110	Pi	10	1.179	50	.5	1.4	50	.6	58	64.4/71.2	1	5.3	23	57	80	80	80	80
9004-100-7111	Pi	10	1.179	50	1	1.4	50	.25	58	64.4/71.2	1	5.3	3	47	75	80	80	80
9004-100-7112	Pi	10	1.179	50	3	1.4	50	.06	58	64.4/71.2	1	5.3	—	23	58	80	80	80
9004-100-7113	Pi	10	1.179	50	5	1.4	50	.015	58	64.4/71.2	1	5.3	—	17	47	80	80	80
9004-100-7114	Pi	10	1.179	50	10	1.4	50	.005	58	64.4/71.2	1	5.3	16	26	35	46	60	80
9005-100-7208	T	15	1.345	50	1	.7	50	.05	58	64.4/71.2	1	5.3	10	26	50	75	75	75
9005-100-7209	T	15	1.345	50	2	.7	50	.09	58	64.4/71.2	1	5.3	10	20	32	56	75	75
9005-100-7210	T	15	1.345	50	4	.7	50	.025	58	64.4/71.2	1	5.3	10	20	29	42	75	75
9005-100-7211	T	15	1.345	50	10	.7	50	.005	58	64.4/71.2	1	5.3	10	20	28	58	61	75

***Transient Suppressor Definitions and Ratings**
VR: Reverse Standoff Voltage
BV: Breakdown Voltage
IPP: Max. Peak Pulse Current
IT: Test Current

NOTE: I.R. must be tested below BV of suppressor.
All numbers on this page are preferred standards.

LOW PASS EMI FILTERS
LB SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)



THD LGTH ×	P/N CTR No.
.190 (4.83)	101
.312 (7.93)	103

Fig. 1

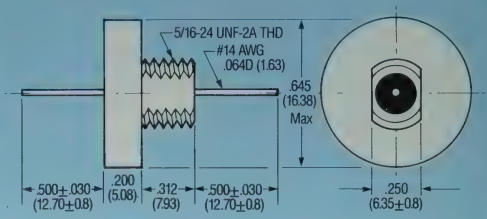


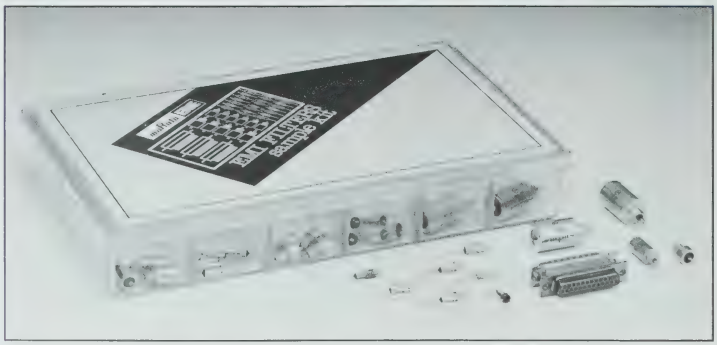
Fig. 2

This filter is epoxy sealed at both ends.

Murata Erie Part No.	Fig.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. (RDC)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9051-101-0018	1	80	50	25	1.4	500	.001	15	25	34	44	60	70
9022-101-0009	2	80	50	50	1.4	—	.001	15	25	34	44	60	70

LOW PASS EMI FILTERS
SAMPLE KIT

EMI FILTERS ENGINEERING DESIGN KIT—PART NO. SMBX-00015



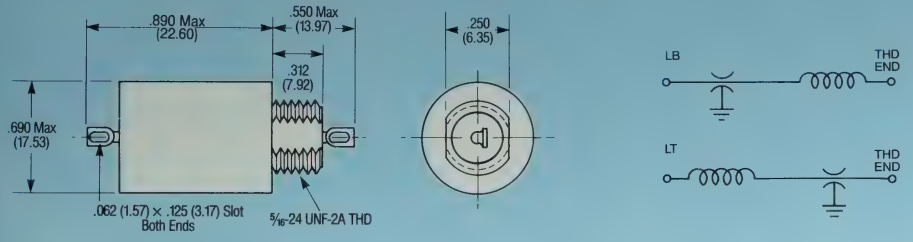
To make the design engineer's EMI/RFI filter selection for prototype development applications easier, Murata Erie North America has developed an extremely useful design engineering kit. This kit includes a typical selection of feed-thru low pass filters, with both eyelet and coaxial mounts and in a variety of circuit configurations. The included filters are selected to meet most application requirements. Specifications, attenuation characteristics and circuit configurations for each filter are also supplied.

Available off-the-shelf for immediate delivery

No.	Part Number	Amount	Description
1	1250-003	5	Single
2	1270-016	3	Single
3	1280-060	2	Single
4	1216-001	3	Single
5	1289-004	3	Single
6	1293-000	3	Single
7	1293-001	3	Single
8	1221-001	3	Single
9	1214-001	10	Single
10	9900-381-6004	3	Coax
11	9900-381-6020	3	Coax
12	9051-100-0011	2	Coax
13	9011-100-2025	2	Coax
14	9011-100-2045	2	Coax
15	9001-100-1015	2	Coax
16	9200-303-0094	2	Coax
17	9011-100-1008	2	Coax
18	1263-339-5003	1	25 Pin "D" Adaptor

LOW PASS EMI FILTERS
L SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)



Typical Weight: 16g

All Tolerances: ±.010 (±.25)

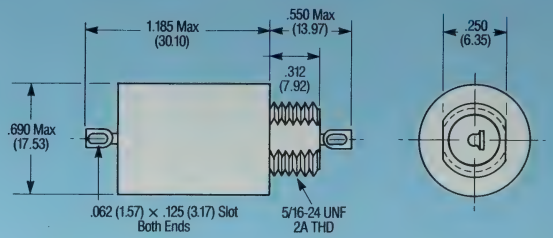
Murata Erie Part No.	Type	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9010-100-0010 9010-100-0015	LT LB	150	100	.5	1.4	500	.3	20	40	58	70	70	70
9010-100-0011 9010-100-0016	LT LB	150	100	1	1.4	500	.21	18	37	55	70	70	70
*9010-100-0012 *9010-100-0017	LT LB	150	100	3	1.4	500	.03	15	26	37	55	70	70
9010-100-0013 9010-100-0018	LT LB	150	100	5	1.4	500	.007	15	25	34	46	70	70
9010-100-0049 9010-100-0050	LT LB	150	100	10	1.4	500	.005	16	24	34	44	60	70
9010-100-0073 9010-100-0078	LT LB	150	100	.5	.7	1000	.3	14	34	52	70	70	70
9010-100-0074 9010-100-0079	LT LB	150	100	1	.7	1000	.21	12	31	49	68	70	70
9010-100-0075 9010-100-0080	LT LB	150	100	3	.7	1000	.03	9	20	31	49	70	70
9010-100-0076 9010-100-0081	LT LB	150	100	5	.7	1000	.007	9	19	28	40	70	70
9010-100-0077 9010-100-0082	LT LB	150	100	10	.7	1000	.005	10	20	28	38	55	70
9010-100-0004 9010-100-0014	LT LB	200	150	.5	.45	1000	.3	10	30	48	68	70	70
9010-100-0000 9010-100-0006	LT LB	200	150	1	.45	1000	.21	8	27	45	65	70	70
9010-100-0002 9010-100-0008	LT LB	200	150	3	.45	1000	.03	6	16	27	45	70	70
9010-100-0003 9010-100-0009	LT LB	200	150	5	.45	1000	.007	6	14	24	36	65	70
9010-100-0045 9010-100-0072	LT LB	200	150	10	.45	1000	.005	7	15	24	34	50	70
9010-100-0053 9010-100-0058	LT LB	450 VDC 240 VRMS @ 400 Hz	300 VDC 240 VRMS @ 400 Hz	.5	.10	1000	.6	—	18	36	55	70	70
9010-100-0054 9010-100-0059	LT LB			1	.10	1000	.25	—	14	32	52	70	70
9010-100-0055 9010-100-0060	LT LB			3	.10	1000	.06	—	5	15	32	70	70
9010-100-0056 9010-100-0061	LT LB			5	.10	1000	.015	—	—	12	24	60	70
9010-100-0057 9010-100-0062	LT LB			10	.10	1000	.005	—	6	12	22	40	60

*Q.P.L. Parts must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

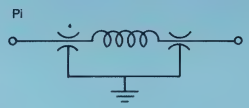
Hardware dimensions and torque specifications are on page 27.

LOW PASS EMI FILTERS
PI SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)



All Tol. ±.010 (.25)



Typical Weight: 21g
Finish: Tin
All Tolerances: ±.010 (.25)
NOTE: Available in silver or gold finish upon request.

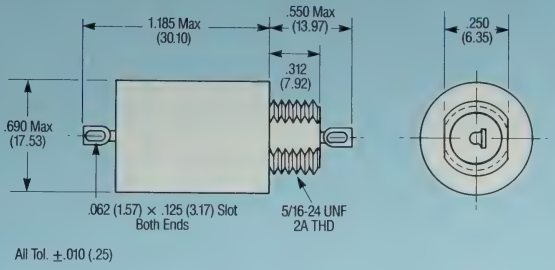
Murata Erie Part No.	Q.P.L. Equiv.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9011-100-1034	—	150 VDC	100 VDC	.5	2.8	200	.3	39	72	80	80	80	80
9011-100-1048	—			.5	1.4	500	.3	27	59	80	80	80	80
9011-100-1035	—			1	2.8	200	.21	35	68	80	80	80	80
9011-100-1049	—			1	1.4	500	.21	22	56	80	80	80	80
9011-100-1036	—			3	2.8	200	.03	13	43	73	80	80	80
9011-100-1050	—			3	1.4	500	.03	—	31	63	80	80	80
9011-100-1037	—			5	2.8	200	.007	—	26	63	80	80	80
9011-100-1051	—			5	1.4	500	.007	—	—	51	80	80	80
9011-100-1038	—			10	2.8	200	.005	20	30	40	50	70	80
9011-100-1052	—			10	1.4	500	.005	15	25	35	45	62	80
9011-100-1026	—			10	1.4	200	.005	—	—	36	55	80	80
9011-100-1039	—	200 VDC	150 VDC	.5	.9	1000	.3	18	51	79	80	80	80
9011-100-1000	—			1	.9	1000	.21	12	48	76	80	80	80
9011-100-1002	—			3	.9	1000	.03	—	18	53	80	80	80
9011-100-1003	—			5	.9	1000	.007	—	13	41	72	80	80
9011-100-1041	—			10	.9	1000	.005	10	20	30	40	58	80
9011-100-1004	*	250 VDC 125 VAC @ 400 Hz	180 VDC 125 VAC @ 400 Hz	1	.5	1000	.35	—	39	68	80	80	80
9011-100-1030	—	450 VDC	300 VDC	.5	.21	1000	.6	—	27	54	80	80	80
9011-100-1008	—			1	.21	1000	.25	—	23	54	80	80	80
9011-100-1031	—	240 VAC @ 400 Hz	240 VAC @ 400 Hz	3	.21	1000	.06	—	4	29	61	80	80
9011-100-1032	—			5	.21	1000	.015	—	—	—	49	80	80
9011-100-1033	—			10	.21	1000	.005	—	9	19	29	40	80

Hardware dimensions and torque specifications are on page 27.

*Q.P.L. Parts must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
T SECTION–COAXIAL HERMETIC STYLE BUSHING MOUNT

DIMENSIONS: in. (mm)



All Tol. ±.010 (.25)

Typical Weight: 21g
All Tolerances: ±.010 (±.25)

Murata Erie Part No.	Voltage Rating (VDC) 85°C	Voltage Rating (VDC) 125°C	IDC (A)	Min. Cap. (μF)	Min. IR (MΩ)	Max. RDC (Ω)	Minimum Insertion Loss from −55°C to +125°C per MIL-STD-220 (dB) 30 KHz	100 KHz	300 KHz	1 MHz	10 MHz	1 GHz
9011-100-2026	150 VDC	100 VDC	1	1.4	500	.5	21	48	75	75	75	75
9011-100-2027			2	1.4	500	.09	15	26	44	70	75	75
9011-100-2028			4	1.4	500	.03	15	24	35	50	75	75
9011-100-2029			10	1.4	500	.005	14	24	34	44	60	75
9011-100-2030			1	.7	1000	.5	14	42	69	75	75	75
9011-100-2031			2	.7	1000	.09	9	21	38	66	75	75
9011-100-2032			4	.7	1000	.03	9	19	29	45	75	75
9011-100-2033			10	.7	1000	.005	9	19	28	39	58	75
9011-100-2034	200 VDC	100 VDC	1	.45	1000	.5	10	38	65	75	75	75
9011-100-2035			2	.45	1000	.09	6	15	34	60	75	75
9011-100-2036			4	.45	1000	.03	6	15	25	41	75	75
9011-100-2037			10	.45	1000	.005	5	15	24	35	50	75
9011-100-2045	450 VDC 240 VAC @ 400 Hz	300 VDC 240 VAC @ 400 Hz	1	.10	1000	.5	—	24	53	75	75	75
9011-100-2040			2	.10	1000	.09	—	—	18	46	75	75
9011-100-2024			4	.10	1000	.03	—	—	12	28	75	75
9011-100-2025			10	.10	1000	.005	—	6	12	23	40	75

Hardware dimensions and torque specifications are on page 27.

*Q.P.L. Parts must be ordered by Military Part Number. See Q.P.L. Cross Reference, pages 28-30.

LOW PASS EMI FILTERS
RECOMMENDED INSTALLATION & HANDLING PROCEDURES

Solder-In Style:
A preheat and postheat cycle is recommended when soldering filters. It is recommended to bring both the ground plane and filter up to 250°F (120°C); once this temperature has been achieved, proceed with soldering. If you are using a localized heat source, such as a soldering iron or hot air torch, apply the heat to the flange and ground plate, keeping the heat away from the ceramic body of the filter. If vapor phase soldering must be used, contact the factory's customer engineering department for instructions.

Soldering:
When soldering to terminals use a heat sink adjacent to the body of the filter if possible. Always try to minimize the dwell time, that is the amount of time the terminal is being heated (recommended time is less than 5 seconds). Keep the tip temperature as low as possible (recommended maximum is 500°F or 260°C).

Solder:
60/40 type solder is recommended for the installation of filters into a ground plate and for connecting wires to leads. Solder preforms, solder coated ground plate, solder paste and wire solder are all acceptable. For installing a number of filters at once into a ground plate, solder preforms are usually the preferred method. This controls the placement and quantity of solder being used.

Flux:
A mildly active, resin flux is recommended for soldering to both filter and terminals.

Torque:
Exceeding recommended mounted torques may result in damage to the capacitors within the filter. Twisting or elongating the metal case by over torquing will fracture the capacitor. The danger here is that the fracture may not be immediately detectable. The filter will, however, fail over time.

Grounding:
Grounding the filter is extremely important. If there is any resistance between the capacitor and ground, the effectiveness of the filter diminishes with higher frequencies. As the impedance of the capacitor approaches zero, the ground resistance becomes significant. This shunts the noise through the filter instead of passing it to ground.

Soldering:
Ceramic capacitors are very sensitive to rapid changes in temperature (thermal shock). Thermal shocking by applying too much heat too quickly can result in cracking. If the capacitor cracks, the filter will fail electrically (usually a low IR). If the glass seal or potting is damaged, moisture can then penetrate the filter and cause various failures such as a low IR, shorts and metal migration.

Cleaning:
Cleaning of filters can be done with Freon Vapor degreasers. Caution must be used when cleaning potted or enamelled units because Freon TMC after several minutes will attack these materials. The recommended cleaning method is Freon TES.

Lead Terminal Modification:
Modifying leads, including bending and cutting is not recommended. This action can break glass seals, split potting and crack ceramic capacitors. When possible purchase a part that does not need modification. If however, leads must be bent or cut, support the lead with a clamping fixture or needle nose pliers next to the glass or potted seal. This will prevent damage to the seal and capacitor.

Attaching a heavy gauge wire, particularly in power lines, to a terminal can stress the seals through the shear bulk or weight of the lead. In a case where a heavy wire must be used, ensure that the wire is supported by a strain relief to ensure the filters are not damaged.

SOLDER-IN TYPES AND MELTING TEMPERATURES

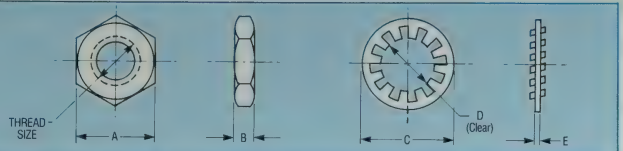
			Plastic Temperature		Liquidous Temperature	
% Sn	% Pb	% Ag	°C	°F	°C	°F
0	100	–	–	–	327	620
5	95	–	272	522	314	597
5	93	2	291	555	313	595
10	88	2	268	514	299	570
15	85	–	183	361	290	554
20	77	3	182	360	277	530
60	40	–	183	361	188	370
60	38	2	177	350	191	375
61.5	35.5	3	179	354	179	354
62	36	2	177	350	189	372
62.5	36.1	1.4	EUTECTIC	–	179	354
63	37	–	EUTECTIC	–	183	361
95	–	5	221	430	246	475

LOW PASS EMIL FILTERS
RECOMMENDED INSTALLATION & HANDLING PROCEDURES

STANDARD HARDWARE DIMENSIONS & PART NUMBERS

Mounting the Filter

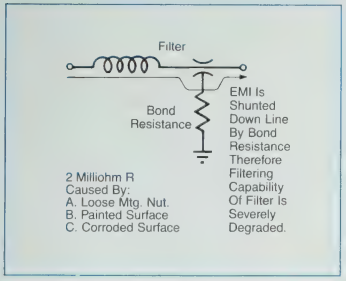
1. Threaded Styles
   Observe the mounting torques listed below with the particular filter being used. Apply torque to mounting nut only. If filter is being installed into a threaded plate, half the recommended torque should be used.

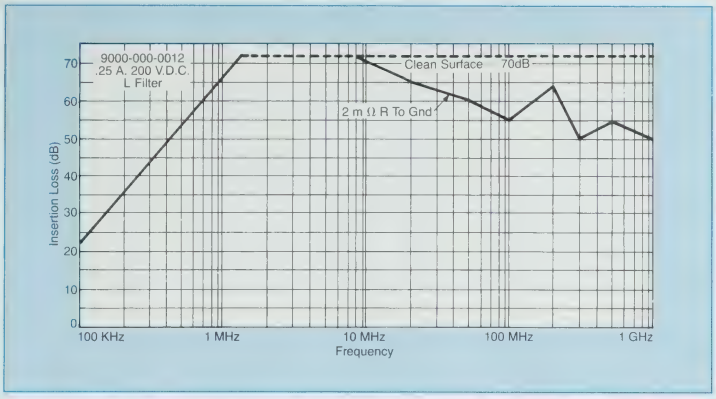


P/N's—Hex Nuts Silver Plated	Nut Thread Size	Suggested Mounting Torque	Hex Nut		Lockwasher			P/N's—Lockwashers Silver Plated
			A	B	C	D	E	
2579-0004	4-40 UNC	3 in. lbs. 34 Ncm	.187 (4.75)	.062 (1.57)	.220 (5.59)	.120 (3.05)	.015 (.38)	2579-0005
2589-0011-01	6-40 UNF	3 in. lbs. 34 Ncm	.187 (4.75)	.062 (1.57)	.280 (7.11)	.145 (3.68)	.015 (.38)	2589-0010-01
2550-0009	8-32 UNC	3-5 in. lbs. 34-56 Ncm	.250 (6.35)	.075 (1.91)	.330 (8.38)	.170 (4.32)	.020 (.51)	2550-0063
2501-0008-01	12-32 UNEF	6-8 in. lbs. 68-90 Ncm	.312 (7.92)	.075 (1.91)	.376 (9.55)	.220 (5.59)	.020 (.51)	2501-0007
2501-0037	12-32 UNEF	6-8 in. lbs. 68-90 Ncm	.250 (6.35)	.075 (1.91)	.376 (9.55)	.220 (5.59)	.020 (.51)	2501-0007
2501-0014	12-28 UNF	6-8 in. lbs. 68-90 Ncm	.312 (7.92)	.075 (1.91)	.376 (9.55)	.220 (5.59)	.020 (.51)	2501-0007
2501-0049	12-28 UNF	6-8 in. lbs. 68-90 Ncm	.250 (6.35)	.075 (1.91)	.376 (9.55)	.220 (5.59)	.020 (.51)	2501-0007
9000-223-004	1/4-28 UNF	7-9 in. lbs. 79-102 Ncm	.312 (7.92)	.090 (2.29)	.402 (10.21)	.261 (6.63)	.020 (.51)	9000-224-019
2502-0008	5/16-32 UNEF	7-9 in. lbs. 79-102 Ncm	.375 (9.53)	.090 (2.29)	.430 (10.92)	.318 (8.08)	.022 (.56)	2502-0007
2502-0012	5/16-24 UNF	7-9 in. lbs. 79-102 Ncm	.375 (9.53)	.090 (2.29)	.430 (10.92)	.318 (8.08)	.022 (.56)	2502-0007
2508-0003	3/8-32 NEF	8-10 in. lbs. 90-113 Ncm	.500 (12.70)	.090 (2.29)	.500 (12.70)	.384 (9.75)	.022 (.56)	2508-0004

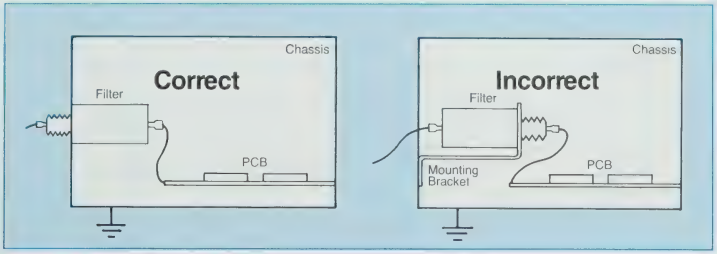
NOTES: 1. All dimension in inches ±0.005 (.13). Thread tolerance class 2.
2. Standard Finishes: Tin, Silver or Gold electroplate to match filter body.
3. Nut material: free machining brass. Washer material: phosphor bronze.
4. When mounting filter without hardware, that is by using a threaded hole, the mounting torque applied to the filter body must be no more than ½ the suggested mounting torque listed above.

The recommended mounting torques and soldering instructions must be adhered to, in order to prevent damage, and insure a good ground path (see Fig. G).





Isolation:
Isolate the input and output of a filter by installing it through a bulkhead. This is mandatory to prevent high frequency noise from skipping around or over the filter (see Fig. H).



QPL
CROSS REFERENCE
MURATA ERIE P/N→MIL P/N

MURATA ERIE PART NUMBER	MILITARY PART NUMBER
1201-052	M15733/61-0001
1201-054	M15733/61-0002
1201-091	M15733/43-0002
1202-075	M15733/61-0003
1202-076	M15733/61-0004
1203-050	M15733/62-0001
1203-081	M15733/62-0003
1204-050	M15733/40-0001
1212-502	M15733/63-0001
1214-001	M15733/33-0001
1214-007	M15733/66-0001
1214-029	M15733/33-0002
1216-003	M15733/61-0009
1221-001	M15733/46-0001
1234-000	M15733/62-0004
1234-001	M15733/64-0001
1250-003	M15733/28-0001
1250-048	M15733/28-0002
1250-049	M15733/43-0002
1250-054	M15733/61-0008
1250-062	M15733/44-0001
1250-063	M15733/44-0002
1251-007	M15733/62-0002
1270-009	M15733/61-0005
1270-016	M15733/61-0010
1270-024	M15733/61-0006
1270-025	M15733/61-0011
1270-101	M15733/61-0007
1297-005	M15733/61-0012
9000-100-0012	M15733/25-0009
9000-100-0015	M15733/25-0001
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9000-100-0036	M15733/25-0008
9000-100-0037	M15733/26-0003
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9000-100-0047	M15733/26-0006
9000-100-0048	M15733/26-0010
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9001-100-1021	M15733/26-0002
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9001-100-1052	M15733/39-0016
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9001-100-1054	M15733/39-0018

MURATA ERIE PART NUMBER	MILITARY PART NUMBER
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9008-181-1000	M15733/39-0015
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9010-100-0031	M15733/27-0006
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MURATA ERIE PART NUMBER	MILITARY PART NUMBER
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9060-100-0003	M15733/23-0038
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QPL
CROSS REFERENCE
MIL P/N→MURATA ERIE P/N

muRata ERIE

MIL-F-15733

MILITARY PART NUMBER	MURATA ERIE PART NUMBER
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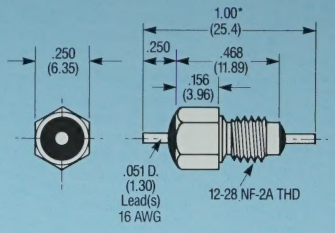
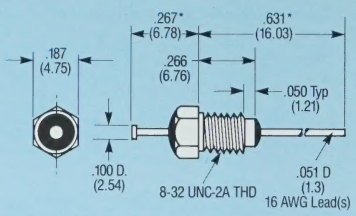
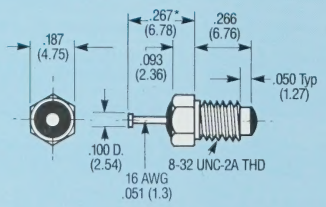
LOW PASS EMI FILTERS
CROSS REFERENCE
MIL-C-39014

DIMENSIONS: in. (mm)	Murata Erie Part No.	Military Part No.	Cap. (pF)	Cap. Tolerance
 WVDC: 200 @ 85°C 100 @ 125°C Imax: 15A	**1201-457**	MIL-C-39014/16-0070	100	±20%
	1201-460	MIL-C-39014/16-0073	150	±20%
	1201-463	MIL-C-39014/16-0076	220	±20%
	1201-466	MIL-C-39014/16-0079	330	±20%
	1201-469	MIL-C-39014/16-0082	470	±20%
	1201-472	MIL-C-39014/16-0085	680	±20%
	1201-474	MIL-C-39014/16-0087	1000	+80% −20%
	1201-475	MIL-C-39014/16-0088	1200	+80% −20%
	1201-099	MIL-C-39014/16-0089	1500	+80% −20%
 WVDC: 500 @ 85°C 300 @ 125°C Imax: 15A	**1250-205**	MIL-C-39014/18-0344	100	+80% −20%
	1250-206	MIL-C-39014/18-0345	220	+80% −20%
	1250-064	MIL-C-39014/18-0346	470	+80% −20%
	1250-207	MIL-C-39014/18-0347	1000	+80% −20%
	1250-056	MIL-C-39014/18-0348	1500	+80% −20%
 WVDC: 500 @ 85°C 300 @ 25°C Imax: 15A	**1250-198**	MIL-C-39014/19-0344	100	+80% −20%
	1250-199	MIL-C-39014/19-0345	220	+80% −20%
	1250-200	MIL-C-39014/19-0346	470	+80% −20%
	1250-201	MIL-C-39014/19-0347	1000	+80% −20%
	1250-057	MIL-C-39014/19-0348	1500	+80% −20%

†: ±.015 (.38)
*: ±.031 (.79)

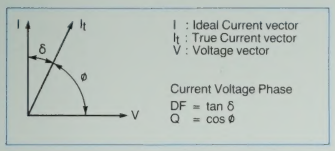
GLOSSARY OF SPECIALIZED TERMS

1–DIELECTRIC:

Sometimes called "insulator," a dielectric is a material whose internal charges are bound and can therefore only move over atomic dimensions. It separates the conductive capacitor plates and is important in determining temperature characteristics, voltage rating, capacity/volume and other characteristics of a capacitor.

2–DISSIPATION FACTOR ("DF"):

The dissipation factor of an insulating material is defined as the ratio of energy dissipated to energy stored in the dielectric. The DF is frequency sensitive and must be specified at a specific frequency.



3–QUALITY FACTOR ("Q"):

The Q factor is the ratio of energy stored to energy dissipated and is therefore often taken as the inverse of the DF at low frequency. Sometimes called "Figure of Merit," Q factors must be specified at a specific frequency.

4–WORKING (OR "RATED") VOLTAGE:

Nominal continuous voltage which may be applied to a component with no derating of any kind.

5–DIELECTRIC WITHSTANDING VOLTAGE:

The peak voltage which the component is designed to withstand without damage for short periods of time. This value must be specified in terms of frequency, waveform, and time.

6–INSULATION RESISTANCE:

I.R. is the terminal to ground DC resistance of a capacitor, and must be specified in terms of voltage, temperature, time, and relative humidity.

7–TEMPERATURE COEFFICIENT ("TC"):

"TC" is the change in capacity per degree change in environmental temperature. This standard definition for "TC" in parts per million per degree centigrade is...

$$TC = \frac{(Cx\text{-}Co)}{Co} \times \frac{(10^6)}{(Tx\text{-}To)}/°C$$

Where "Tx" is the test temperature, "To" is the reference temperature—usually 25°C. "Co" is the capacity measured at the reference temperature and "Cx" is the capacity measured at the test temperature.

8–VOLTAGE COEFFICIENT:

All high K dielectrics experience reduced dielectric coefficient (capacity) in the presence of strong unidirectional electric fields. For some materials, and package designs, this effect can become very dramatic. Lower K materials are less susceptible to this phenomenon. (Usually specified in pF/Volt).

9–TERMINATION:

This term refers to the material and/or geometry of the terminals of the capacitor.

10–MONOLITHIC OR MULTI-LAYER CAPACITOR:

All of these terms, and any combination of them, refer to a ceramic capacitor style which consists of alternate layers of ceramics and conductive (metallic) surfaces which are compressed and vitrified to form a single "monolithic" structure. Alternate metallic surfaces are then interconnected to form a two-terminal capacitor.

11–CAPACITOR:

Capacitor is an electrical charge storage device composed of conducting plates (electrodes) separated by dielectric material. Ceramic dielectrics are used for manufacturing Murata Erie capacitors. These devices are used in electronics industry in coupling and by-pass application, frequency determining and timing elements, filters and delay line components, resonant circuit elements, etc.

12–CAPACITANCE:

The capability of a system of two or more parallel conductive plates to store electrical energy in an electrostatic field between them. Capacitance expressed in Farads is dependent on the properties of dielectric material and geometry of the capacitor.

13–DIELECTRIC CONSTANT (K) (PERMITIVITY)

The ratio of the ability of dielectric material to store electrostatic charge to that stored by a vacuum as dielectric in the same electrode geometry.

14–DCR:

This term refers to a measure of the direct current series resistance of an EMI filter (input with respect to the output).
Note: By applying ohms law, the maximum voltage drop can be calculated as well.

VOLT DROP = RATED CURRENT X DCR

15–INSERTION LOSS:

The loss in load power due to the insertion of a component or device at some point in a transmission system. Generally expressed as the ratio in decibels of the power received at the load before insertion of the apparatus, to the power received at the load after insertion. It is calculated using the following formula:

$$I.L.\ (dB) = 20\ LOG_{10}\ (V_{out}/V_{in}).$$

16–ATTENUATION:

A reduction in energy. It is calculated as a ratio of V_o vs. V_i of a filter inserted into a system.

17–HERMETIC:

Permanently sealed by fusion, soldering or other means, to prevent the transmission of air, moisture vapor and all other gases.

*Hermetic filters listed in this catalog have Leak Rates less than 1×10^{-7} Atm•cc/sec.

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Panafax: 404-436-3030

Regional Sales Offices:

Northeast	— 617-245-7880	Southwest	— 714-832-9972
Southeast	— 407-644-0954	Northwest	— 503-646-4973
Mid-Atlantic	— 301-494-0405	Western	— 818-701-9702

Corporate Address: 2200 Lake Park Drive, Smyrna, Georgia 30080 (404-436-1300)

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